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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/591,343	08/31/2006	Masaru Sasaki	295715US26PCT	9501
22850	7590	10/22/2008	EXAMINER	
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			MALEK, MALIHEH	
			ART UNIT	PAPER NUMBER
			2813	
			NOTIFICATION DATE	DELIVERY MODE
			10/22/2008	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/591,343	<b>Applicant(s)</b> SASAKI ET AL.	
	<b>Examiner</b> MALIHEH MALEK	<b>Art Unit</b> 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10/06/2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4,7 and 8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,7 and 8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08/31/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/23/2006</u> .  | 6) <input type="checkbox"/> Other: _____                          |

### 17DETAILED ACTION

This office action is in response to the application filed on 10/06/2006.

#### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in **Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966)**, that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: (***See MPEP Ch. 2141***)

- a. Determining the scope and contents of the prior art;
- b. Ascertaining the differences between the prior art and the claims in issue;
- c. Resolving the level of ordinary skill in the pertinent art; and
- d. Evaluating evidence of secondary considerations for indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguwa (Pub. No.: US 2003/0170942 A1) in view of Lim et al. (Pub. No.: US 2005/0009281 A1), herein Lim.

Regarding claim 1, Taguwa teaches a method for manufacturing a prescribed semiconductor device by forming a film mainly formed of tungsten and a film of a component different from the film mainly formed of the tungsten on a semiconductor substrate, comprising: forming a first layer, which is formed of the film of the component different from the film mainly formed of the tungsten, on the semiconductor substrate; forming a second layer, which is formed of the film mainly formed of the tungsten, on the semiconductor substrate; and forming an oxide film 20 on an exposed surface of the first layer ([0021], [0032] and [0040]).

However, regarding claim 1, Taguwa does not teach forming an oxide layer by plasma processing at a process temperature of 300°C or more using a process gas containing oxygen gas and hydrogen gas at a flow rate ratio (hydrogen gas flow rate/oxygen gas flow rate) of the hydrogen gas to the oxygen gas of 2 or more and 4 or less.

In the same field of endeavor, regarding claim 1, Lim teaches a method of forming an oxide layer by plasma processing at a process temperature of 300°C or more using a process gas containing oxygen gas and hydrogen gas at a flow rate ratio (hydrogen gas flow rate/oxygen gas flow rate) of the hydrogen gas to the oxygen gas of 2 or more and 4 or less ([0015]) to implement a low temperature oxidization ([0007]). Lim discloses the claimed invention except for the exact range of hydrogen gas flow rate/oxygen gas flow rate. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a range of 2 or more and 4 or less for the hydrogen gas flow

rate/oxygen gas flow rate, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233 (CCPA 1955).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Taguwa by forming an oxide film by using a plasma to implement a low temperature oxidization (Lim, [0007]).

Regarding claim 2, Taguwa teaches a method for manufacturing a semiconductor device wherein the semiconductor device is a transistor, and a gate electrode is formed of the first layer and the second layer ([0002]).

Regarding claim 3, Taguwa teaches a method for manufacturing a semiconductor device wherein the second layer is a tungsten layer or a tungsten silicide layer ([0032]).

Regarding claim 4, Taguwa teaches a method for manufacturing a semiconductor device where the first layer is a silicon layer ([0021]).

Regarding claim 7, Taguwa teaches a method for plasma oxidation of a film of a component different from a film mainly formed of tungsten of a semiconductor substrate on which the film mainly formed of the tungsten and the film of the component different from the film mainly formed of the tungsten are formed, comprising: and forming an oxide film on an exposed surface of the film of the component different from the film mainly formed of the tungsten ([0021], [0032] and [0040]).

However, regarding claim 7, Taguwa does not teach forming an oxide layer by plasma processing at a process temperature of 300°C or more using a process gas containing oxygen gas and hydrogen gas at a flow rate ratio (hydrogen gas flow rate/oxygen gas flow rate) of the hydrogen gas to the oxygen gas of 2 or more and 4 or less.

In the same field of endeavor, regarding claim 7, Lim teaches a method of forming an oxide layer by plasma processing at a process temperature of 300°C or more using a process gas containing oxygen gas and hydrogen gas at a flow rate ratio (hydrogen gas flow rate/oxygen gas flow rate) of the hydrogen gas to the oxygen gas of 2 or more and 4 or less ([0015]) to implement a low temperature oxidization ([0007]). Lim discloses the claimed invention except for the exact range of hydrogen gas flow rate/oxygen gas flow rate. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a range of 2 or more and 4 or less for the hydrogen gas flow rate/oxygen gas flow rate, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233 (CCPA 1955).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Taguwa by forming an oxide film by using a plasma to implement a low temperature oxidization (Lim, [0007]).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taguwa in view of Lim and further in view of Liu.

Regarding claim 8, the Taguwa/Lim combination teaches a plasma processing method wherein it appears silent on whether the plasma is excited by a microwave to increase surface oxidization reaction; however, Lim teaches ultraviolet rays rather than microwave are used. The use of microwaves to excite the plasma is notoriously well known to one of ordinary skill in the art. In support of this assertion, the examiner cites Liu et al. (Pub. No.: US 2004/0072446 A1 at paragraph 35. Consequently, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use microwave to excite the plasma as this is a functional equivalent manner of exciting the plasma.

### ***Conclusion***

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yamamoto et al. (Pat. No.: US 7,049,187 B2) teach an oxidation treatment for regenerating a gate insulating film that is performed after forming gate electrodes of a polycrystalline silicon structure in which a  $WN_x$  film and a W film are stacked on a polysilicon film, the wafer is heated and cooled under conditions for reducing a W oxide on the sidewall of each gate electrode.

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4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MALIHEH MALEK whose telephone number is (571)270-1874. The examiner can normally be reached on Mon-Fri, 8:30-6pm ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571)272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew S. Smith/  
Supervisory Patent Examiner, Art  
Unit 2823

Oct. 10, 2008

/M. M./  
Examiner, Art Unit 2813